Station Circular 76 June, 1926

Oregon Agricultural College

Experiment Station

Apple Thinning in Hood River Valley

By

Gordon G. Brown

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Apple Thinning in Hood River Valley

By

Gordon G. Brown

The following brief report has to do with two apple thinning experiments conducted in Hood River Valley during 1922 and 1923. Newtown and Ortley were the varieties chosen for these tests. The former contributes a greater tonnage from this section than any other variety. The object of these experiments was to test the influence of thinning at different distances on the size of fruit and to estimate the commercial value of the resultant product. References are also included which indicate the present status of the practice of thinning; its possibilities and limitations.

ORTLEY EXPERIMENT

Eleven-year-old Ortleys were chosen for this test. They were healthy, vigorous trees growing on a Parkdale loam (popularly called "Red Shot") in the Upper Valley. This variety is characteristically a heavy bearer, and very often sizes tend to run small where the "set" has been heavy and thinning not practiced. Under growing conditions not fully understood, especially where sizes are large, the fruit is often malformed at the calyx end and is popularly referred to as "sheep's nose." Nitrate of soda, 3 pounds per tree, was applied in early spring of 1922 and clean cultivation practiced, following the turning under of a heavy stand of hairy vetch. These practices were reflected in dark, heavy foliage and excellent terminal growth. The trees are of very uniform size. Obviously these facts should be visualized in studying results of thinning.

Following an especially heavy bloom, it was notable that a very high percentage of the fruit had set. In some cases there were as many as two to three apples on a single cluster, although this was the exception. In no case was more than one apple left on a fruit spur in thinning. The heavy set and even distribution made it possible to thin the fruit to very uniform distances as follows:

Plot No.	No. of trees	Spacing of fruit
1	5	4 inches
2	5	7 inches
3	5	9 inches
4	5	no thinning

Thinning was done at a comparatively late date, July 29, 1922. At that time the fruit averaged 1.47 inches in cross-section or about the size of a large walnut. A good growing season followed.

Picking was done on October 29. At that time the number of loose boxes per tree was recorded.

SIZES

Table I indicates yields and relative sizes. From the data it is evident that thinning exerted a marked influence upon the size of the fruit. Only 2.29 percent of the fruit was of four-tier size in the unthinned plot and 7.14 percent in the four-inch thinning. In the unthinned plot 55.81

percent classed as five-tier-and-smaller. In the thinned plots the percentage of five-tier apples was almost negligible, not exceeding 4.66 percent in the four-inch thinning and 0.15 percent in the seven-inch thinning. Attention is called to the high proportion 88.2 percent of four-and-one-half tier apples in the four-inch thinning, and the remarkably uniform size of fruit.

TABLE I. YIELDS PER TREE AND SIZE OF FRUIT—ORTLEY
(See also Table II)

Plot No.	Thinned distance	Loose boxes per tree average	Percentage—according to size		
			Four-tier and larger	Four-and-one-half-tier	Five-tier and smaller
1	4 inches	21.56	7.14	88.2	4.66
2	7 inches	16.1	59.85	40.0	.15
3	9 inches	15.50	66.1	32.3	1.6
4	No thinning	17.66	2.29	41.9	55.81

4 tier includes the following sizes per box: 125 and larger.
4½ tier includes the following sizes per box: 138 to 163.
5 tier includes the following sizes per box: 175 to 225.

TABLE II. ESTIMATED VALUE OF FRUIT SHOWN IN TABLE I

Plot No.	Thinned distance	Average yield per tree packed box basis*	Estimated value of grade			Total value per tree
			Four-tier and larger	Four-and-one-half-tier	Five-tier and smaller	
1	4 inches	16.20	$ 1.51	$16.85	$0.760	$19.12
2	7 inches	12.10	9.48	5.71	.018	15.20
3	9 inches	11.60	10.03	4.43	.180	14.64
4	No thinning	13.25	.40	6.55	7.390	14.34

*A packed box is estimated at 75 percent of a loose box as shown in Table I.

YIELDS

Table I indicates yields per tree in loose apple boxes slightly heaped. Four-inch thinning leads with 21.56 boxes average per tree. Seven- and nine-inch thinning resulted in reduced yields—16.1 boxes average for trees thinned seven inches and 15.50 boxes for those thinned nine inches. Trees not thinned average 17.66 boxes.

VALUE OF THINNING

Other factors being equal the greatest value may be attached to trees producing the largest number of boxes and the highest percentage of four-tier size. In the experiment here recorded, largest sizes accompany heaviest thinning but with yields somewhat reduced. The practical measure of thinning may be arrived at only after a thorough consideration of value which may be attached to the resultant fruit. Table II is intended to show the value of the fruit from the different thinnings reduced to a packed-box basis. Owing to the exceptionally fine quality of the fruit handled in this test, a loose box is estimated at 75 percent of a packed box.

The Ortley trees in this orchard in 1922 produced 3563 packed boxes, grades as follows: Extra-Fancy 64.3 percent; Fancy, 33.1 percent; and

"C" Grade, 2.6 percent. The average "weighted" value (1919-1923 inclusive), of four-tier-and-larger for all grades was $1.31 per box; four-and-one-half tier $1.18; and five-tier, $1.00. Using the above figures as a basis, in Table II, the money value of fruit per tree for each plot has been estimated. The relation between yields and sizes is clearly indicated.

Plot 1 (thinned 4 inches), credited with 16.2 packed boxes, has the highest money value, $19.12 per tree. Although this plot shows very little value of fruit in the four-tier class, it is notable that practically the entire balance is in the four-and-one-half tier column. Plot 1 shows a clear superiority of $4.78 per tree in the value of fruit as compared with Plot 4 (unthinned). On an acre basis the difference would be marked.

Fig. 1. On left, Ortleys thinned 4 inches averaged 21.56 loose boxes per tree valued at $19.12. On right, unthinned averaged 17.6 boxes valued at $14.34.

The practical value of seven- and nine-inch thinning under the conditions cited in this experiment is not established. Differences as compared with Plot 4 (unthinned) are not great and might easily be attributed to experimental error or other unknown factors over which there was no control. The exceptional vigor of the trees is again cited in properly interpreting these data. Undoubtedly in the case of trees exhibiting less vigor with an equally heavy set of fruit, wider spacing than four inches would be productive of greatest returns on the labor invested.

NEWTOWN EXPERIMENT

Fifteen-year-old Newtowns, growing on an Underwood loam in the Lower Valley, were chosen for a thinning test on June 26, 1923. The orchard had been clean cultivated for five seasons and fertilized with nitrate of soda each spring at the rate of two to three pounds per tree. In early March, 1923, four and one-half pounds nitrate were so used. The trees are large and vigorous. The bloom was very heavy during the year of this test followed by a high percentage of "set."

Thinning was done with hand shears according to the following plan of spacing: Plot 1 thinned to 5 inches; Plot 2, thinned to 7 inches; Plot 3, thinned to 12 inches, and Plot 4, unthinned. In no case was more than one apple left to a spur. The characteristic habit of this variety to bear fruit on medium short terminal growths as well as on spurs is emphasized.

Table III shows the average yield per tree in loose boxes and the percentage of fruit classified as four-tier and larger, four-and-one-half tier, and five-tier and smaller.

SIZES

Table III indicates that Newtowns carrying a heavy crop are apparently less responsive to thinning in the production of four-tier sizes than Ortleys. Where no thinning was done, only 2.16 percent of Newtowns were four-tier and for twelve-inch thinning 22.17 percent. Differences as between a five- and seven-inch thinning were practically negligible, there being 16.73 percent four-tier in the five-inch thinning, and 15.29 in the seven-inch. The same relation applies with reference to five-tier and smaller. That 57.0 percent of the fruit not thinned was five-tier and smaller is significant.

YIELDS

In this experiment five- and seven-inch thinning gave greater yields than no thinning. The record shows 27.00, 25.00, and 23.5 loose boxes per tree respectively. This is accounted for by the relatively small percentage of five-tier and the larger percentage of four-tier in the case of thinning.

Twelve-inch thinning resulted in considerable loss in tonnage. The average was 9.5 boxes per tree less than for trees not thinned. This fact obtained even though trees so handled produced 20.1 percent more four-tier fruit than trees not thinned.

TABLE III. YIELDS PER TREE AND SIZE OF FRUIT—NEWTOWN
(See also Table IV)

Plot No.	Thinned	Average yields per tree (loose boxes)	Percentage—according to size		
			Four-tier and larger	Four-and-one-half tier	Five-tier and smaller
1	5 inches	27.00	16.73	63.22	20.05
2	7 inches	25.00	15.29	66.34	18.37
3	12 inches	14.00	22.17	68.19	9.64
4	No thinning	23.5	2.16	40.84	57.00

TABLE IV. ESTIMATED VALUE OF FRUIT SHOWN IN TABLE III

Plot No.	Thinned distance	Average yield per tree packed box basis*	Estimated value of grades† Four-tier and larger	Four-and-one-half tier	Five-tier and smaller	Total value per tree
1	5 inches	20.25	$4.73	$16.00	$ 4.64	$25.37
2	7 inches	18.75	4.00	15.53	3.94	23.47
3	12 inches	10.50	3.24	8.93	1.17	13.34
4	No thinning	17.60	0.53	8.99	11.43	20.95

*A packed box is estimated at 75 percent of a loose box as shown in Table III.

†Based on average net price to grower by Apple Growers Association for years 1919-1923 inclusive. This orchard in 1923 produced 2231 boxes of Newtowns, grades as follows: Extra Fancy, 46.0 percent; Fancy, 43.7 percent; and "C" Grade, 10.3 percent. The average "weighted" value of four-tier and larger for all grades was $1.40 per packed box; four-and-one-half tier, $1.25, and five-tier, $1.14.

PRACTICAL CONSIDERATIONS

Table IV summarizes Table III in a similar manner to Table II for Ortleys. Does thinning pay, and if so to what extent in dollars and cents? Yields are reduced to a packed-box basis and the fruit credited

Fig. 2. On left, Newtowns thinned 7 inches averaged 25 loose boxes per tree valued at $23.47. On right, thinned 12 inches averaged 14 boxes valued at $13.34. Excessive thinning cost money and resulted in loss.

according to size and grade, prices being established by weighted average (1919-1923) for each tier size.

A five-inch thinning appears most practical in view of the costs for labor involved in this work. The average tree value of fruit for Plot 1 (5 inches thinned) is $25.37 compared with $23.47 for Plot 2 (7 inches

thinned) and $20.95 for Plot 4 (unthinned). Lowest yields in Plot 3 (12 inches thinned) are credited with only $13.34 per tree or an average loss of $7.61 compared with no thinning. To this must be added the cost of labor employed in such excessive thinning work.

CITATIONS FROM OTHER EXPERIMENTAL WORK

Table V shows the results of thinning 12-year-old Winesaps in the Milton-Freewater district in 1921. Trees of this variety, upon reaching mature age, tend to produce small fruit if left unthinned. Results of this test show the practical value of thinning to as much as six inches or more. This would be expected in the case of an apple where high color is required in the better grades. Acknowledgment is made to Clayton L. Long of the Oregon Agricultural College Extension Service for these data.

TABLE V. THINNING DEMONSTRATION ON 12-YEAR-OLD WINESAPS.
Orchard of J. F. Slover, Freewater, Oregon. 1921.

Thinning Treatment	Grade	163 and larger Box value	163 and larger No. boxes	175 and smaller Box value	175 and smaller No. boxes	Total boxes	Value per Tree	Value per Acre
	Extra fancy	$2.00	½	$1.50	1	1½	$ 5.87½	$305.50
No thinning	Fancy	1.75	0	1.25	1½	1½		
	C. Grade	1.50	0	1.00	1½	1½		
	Culls	------	----	------	----	10¼		
	Extra fancy	2.00	2	1.50	1	3		
Thinned 3″ to 4″ apart	Fancy	1.75	½	1.25	½	1	11.25	585.00
	C. Grade	1.50	1	1.00	2¾	3¾		
	Culls	------	----	------	----	5¼		
	Extra fancy	2.00	3½	1.50	1	4½		
Thinned 6″ to 7″ apart	Fancy	1.75	1	1.25	½	1½	15.62½	812.50
	C. Grade	1.50	1½	1.00	2½	4		
	Culls	------	----	------	----	1¾		
	Extra fancy	2.00	3½	1.50	½	4		
Thinned 9″ to 10″ apart	Fancy	1.75	1½	1.25	0	1½		
	C. Grade	1.50	1½	1.00	2½	4	15.12½	786.50
	Culls	------	----	------	----	2		

CLAYTON L. LONG,
Extension Horticulturist,
Oregon Agricultural College.

From the very complete experimental work in thinning done at the West Virginia Experiment Station,* certain important conclusions are here appended.

"Results show that where apple trees are in bearing from a medium to a heavy crop of fruit, the removal of part of this fruit by thinning is a very profitable practice. Under certain conditions, however, such as light crops with fertile soils and vigorous trees, thinning may not pay.

"In all cases where the trees had a good crop, thinning increased the size of the fruit. In some plots an extra large grade was secured, while in others considerable fruit was made saleable which otherwise would not have been so.

"The color of fruit on heavily-loaded trees was much superior when thinning was practiced. The apples not only took on a deeper red color

*"Five years' investigations in apple thinning." By E. C. Auchter. West Virginia University Agricultural Experiment Station, Bulletin 162.

but were also colored more evenly and all apples were more uniform in color.

"**Effect of thinning on annual bearing.** While final conclusions are not attempted, results indicate that thinning does not influence subsequent crops nor cause trees, naturally biennial in bearing habit, to bear a crop each year."

THE TONNAGE FACTOR

The greatest factor influencing gross returns from the apple orchard is tonnage. This idea, of course, must be consistent with good quality and fair size but tonnage must not be greatly sacrificed in thinning in order to secure slightly increased sizes and possibly better color in red varieties. The general idea is illustrated in Table VI.* Orchards were grouped according to the gross value of fruit per acre. The relation of acre-value to yields is clear cut. The factor of grades is somewhat obscure.

TABLE VI. RELATION OF GROSS ANNUAL VALUE OF FRUIT PER ACRE FOR THE PERIOD 1913-1918, INCLUSIVE, TO AVERAGE ANNUAL YIELDS PER ACRE AND PERCENTAGES OF EXTRA FANCY FRUIT AND FOUR-TIER SIZES

Group	Orchard average				Newtown			Spitzenburg		
	Gross value of fruit per acre.	Boxes per acre.	Percent		Boxes per acre.	Percent		Boxes per acre.	Percent	
			Extra fancy.	Four-tier.		Extra fancy.	Four-tier.		Extra fancy.	Four-tier.
I	$461	365	46	49	368	49	45	370	42	47
II	290	251	47	51	230	50	46	263	45	55
III	204	182	44	47	165	45	43	186	41	48

Note—Group I represents 24.4 percent of the orchards studied; Group II, 40.9 percent; Group III, 34.7 percent.

TABLE VII. AVERAGE NET RETURNS PER BOX, 1919-1923 INCLUSIVE, ACCORDING TO SIZE OF FRUIT AND GRADES. APPLE GROWERS ASSOCIATION, HOOD RIVER, OREGON

Variety	Extra fancy			Fancy			Choice		
	Four-tier	Four-and-one-half tier	Five tier	Four-tier	Four-and-one-half tier	Five tier	Four-tier	Four-and-one-half tier	Five tier
Newtown	1.58	1.43	1.33	1.34	1.18	1.08	1.08	.92	.83
Spitzenburg	1.60	1.40	1.21	1.33	1.14	.94	1.06	.87	.65
Ortley	1.38	1.33	1.13	1.26	1.06	.88	.99	.81	.63
Delicious	2.09	1.79	1.43	1.77	1.47	1.12	1.44	1.15	.78
Jonathan	1.75	1.34	1.16	1.10	1.09	.93	1.01	.81	.64
Red Cheek	1.60	1.40	1.18	1.35	1.15	.94	1.09	.89	.69
Ark. Black	1.80	1.56	1.38	1.51	1.30	1.10	1.07	1.04	.87
W. Banana	1.78	1.50	1.20	1.46	1.20	.91	1.14	.92	.66
Average	1.69	1.47	1.25	1.39	1.19	.99	1.11	.92	.72

*"Hood River apple orchard management with special reference to yields, grades and value of fruits." By Gordon G. Brown. Oregon Agricultural College Experiment Station, Bulletin 181.

SIZE OF FRUIT FACTOR

Table VII summarizes average returns for eight leading varieties grown in the Hood River Valley, covering the period 1919-1923 inclusive. Irrespective of grade, the market's preference for four-tier sizes is unmistakable. The average differential in price between the three-tier sizes is approximately 20 cents per box. Market preferences for the larger sizes is especially pronounced in the case of red varieties.

CONCLUSIONS

From the data submitted, the beneficial influence of proper thinning is evident. The aim should be to increase or maintain high yields consistent with size and good quality. Obviously the practice calls for thoroughness and good judgment. Experience undoubtedly will prove the best teacher. The aim of this discussion has been, not arbitrarily to define what distances apart fruits should be thinned but rather to correlate all factors which make for greatest market value of the total product.

The data presented clearly indicate two extremes; one, no thinning of heavily loaded trees; the other, excessive thinning, as, for example, twelve inches, in the Newtown experiment. Except for special markets, the former practice produces apples too small, whereas the latter results in reduced tonnage which is reflected in smaller monetary returns. Generally, a thinning of from four to six inches will be satisfactory.

From present indications, which point to a big crop, 1926 will prove to be a year when thinning will pay. Lack of proper attention to this practice may result in heavy loss. In the case of trees with a small crop well distributed, thinning may be light and in some cases omitted altogether. In the case of certain limbs heavily loaded, on trees otherwise with a small crop, thinning should be done as thoroughly as though the crop were heavily distributed over the entire tree. Work may be done more cheaply after the "June drop," but otherwise early thinning is advised. Fruit may be removed either by shears or by hand. In the latter case care should be exercised not to tear the fruit stem basis.

Finally, it is emphasized that only a small part, if any, of the cost of thinning should be charged against the thinned trees. Fruit thinned off would have to be removed at picking time any way, and the cost of removal would be about the same in either case. Furthermore, the cost of sorting is greater in the case of unthinned trees and often a high percentage of the culls are of little value. As a means of controlling codling-moth, thinning exerts a very helpful influence. Where fruit hangs in clusters, "doubles," thinning one fruit to a spur enables more effective spraying.

Acknowledgments. The author is greatly indebted to Messrs. Childs and Graff for the privilege of conducting the Ortley thinning experiment in their orchard and for material assistance. To Mr. J. E. Cozad thanks are also due for assistance in conducting the Newtown experiment. Mr. Childs also read and criticized the manuscript.